

Model 75 L Hit Counter &
Jitter Set Adapter
Notes on 75L/P Adapter

INSTRUCTION MANUAL

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December 14, 1984

75L HIT COUNTER AND JITTER SET ADAPTER

Installation

The 75L Hit Counter requires a 115V, 60 Hz service line, 310 patch cords and a 75LM or 75LMA Jitter Set or a PB-1C Vector Analyzer. The 75L Hit Counter is connected to the Jitter Sets or the PB-1C by a 310 patch cord between jacks labeled INTERCONNECT A at both ends. This 310 cord should include a sleeve conductor to carry the ground connection from Jitter Set or PB-1C to the 75L. A second 310 patch cord may be used between INTERCONNECT B jacks. This second patch cord provides dropout counting from a manually set received tone level, i.e., dropouts are measured with respect to tone level at time of setting. If INTERCONNECT B is not patched, dropouts will be counted from the current AGC'd tone level thus counting only sudden level losses and ignoring slowly changing receive levels.

The 75LM or 75LMA Jitter Sets do not have a built-in RFI filter in the power cord. The 75L Hit Counter does. In order to take advantage of the 75L RFI filter a receptacle is provided on the back of the 75L into which the line cord of the associated Jitter Set must be plugged. This is not a convenience outlet, it is solely for use with Jitter Sets. In order to protect the Hit Counter RFI filter against external shorts, this receptacle is fused by the Hit Counter panel fuse.

The 75LM, 75LMA, or PB-1C must be connected to a line receiving a 1004 Hz test tone (990 Hz to 1030 Hz) at a level between -40 dBm to +10 dBm.

After completing interconnecting and allowing time for the "75L signal source" (jitter set or PB-1C) phase lock loop to synchronize, calibration may proceed.

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Calibration

After installation and synchronization of the tone source as indicated by the "DO NOT READ" indicator of the jitter set or by the "DO NOT READ CRT" indicator of the PB-1C being extinguished, push the MASSIVE HIT button and either the PHASE EVENT or GAIN EVENT button to extinguish the pushbutton lamps of the 75L. The MASSIVE HIT lamp, when lit, indicates that the jitter set phase lock loop has gone out of synchronization since the pushbutton was last depressed. Similarly the PHASE EVENT or GAIN EVENT lamps, when lit, indicate the occurrence of a phase or gain disturbance since either button was last depressed. The ^{event} disturbances thus signaled do not qualify for the 41009 definition of a phase hit or a gain hit.

Turn the METER MODE selector switch to the CAL position. The CAL ADJ (screw-driver adjustment) should be turned to set the signal input to the 75L so that the Meter pointer is in the center of its scale as indicated by the index line between JITTER and CAL on the meter face. This adjustment accounts for differences in the AGC'd output level from different tone sources for the 75L. It should be checked occasionally but should not require readjustment except when the 75L signal source is changed, i.e., the 75L is used with a different jitter set or PB-1C.

Place the Meter Mode selector switch in the DROPOUT CAL position. Turn the DROPOUT CAL ADJ panel knob under the DROPOUT Counter to center the meter needle as above. This adjustment affects the reference level from which a 12 dB loss is measured for the DROPOUT Count. As mentioned in the first paragraph, the reference level for dropout counts will be the received level at the time this adjustment is made if the INTERCONNECT B cable is used. If the "B" 310 patch cord is omitted, DROPOUTS will be counted for a 12 dB level drop of 4 milliseconds duration with respect to recent average received level. Either with or without the presence of an INTERCONNECT B patch, the DROPOUT CAL ADJ must be set. In the absence of the INTERCONNECT B patch, a slowly changing input level will not affect the DROPOUTS count.

PHASE HITS, GAIN HITS, and DROPOUTS Counters

Each counter has a range of 9,999 counts and includes a reset button. The threshold level for counting is as follows:

PHASE HITS	10° , 15° , 20° , 25° , 30° , 40° , 45°
GAIN HITS	± 2 dB, ± 3 dB, ± 4 dB, ± 6 dB
DROPOUTS	12 dB loss from received level existing when the DROPOUT CAL ADJ is set if INTERCONNECT B is patched, or from recent average level if INTERCONNECT B is not patched.

Timing: All hits to be counted must exceed the preset threshold for $4 \pm .4$ milliseconds.

Exclusion: Each counter circuit is provided with a 140 millisecond dead zone after recording a count. The maximum count rate is 7 counts per second.

Simultaneous disturbances:

If a dropout is counted at the same time a phase hit or a gain hit occurs, the phase hit and gain hit counters are inhibited for 140 milliseconds and do not register counts. A disturbance whose effects persist for 140 milliseconds may cause sequential gain or phase hit counts after a dropout.

A gain and a phase hit occurring together will register 1 count on each register if the respective thresholds are exceeded. There is some minor cross coupling which tends to emphasize gain hits over phase hits for gain loss hits occurring simultaneously with phase hits. Also gain increase hits will be deemphasized if occurring simultaneously with phase hits.

Disturbances which exceed set thresholds but with less than 4 millisecond duration are indicated by the PHASE EVENT and GAIN EVENT lamps. These lamps are extinguished by pushing either button.

The EVENT lights should be manually extinguished at the start of any run. They should be manually extinguished during a run, when they are illuminated, and the fact of their occurrence noted. Consistent illumination of the PHASE EVENT light, without occasional illumination of the GAIN EVENT lights, when the hit thresholds are set for comparable transient magnitude, is an indication that narrow phase hits are present. The same thing is true for gain hits if the GAIN EVENT light is consistently illuminated. A relatively equal number of gain and phase events is an indication of non-correlated hits (impulse).

The MASSIVE HIT light indicates that a disturbance of sufficient magnitude to cause loss of phase lock has occurred, for example a tone interruption. This condition, if it has sufficient duration, may significantly reduce the effective test interval. Thus the occurrence of a MASSIVE HIT during an unattended test may require that the test run be repeated. This is not a problem during an attended test because the tester can observe the duration of the MASSIVE HIT by observation of the jitter set DO NOT READ lamp or the PB-1C DO NOT READ CRT lamp.

Speaker - The speaker of the 75L provides the capability of listening to notched noise. This is the noise remaining after the tone is removed. The notch in the 75 series jitter sets is a 3 or 4 Hz wide tracking notch. The residual components in the jitter set notch are the non-tone components of the received signal plus typically -36 to -40 dB residual 2nd and 3rd harmonic of the test tone. The harmonic content of the PB-1C notch is about

10 dB less. The harmonic components are due to mechanization of the jitter sets, there being no need for any better notch to measure jitter. The purpose of providing a speaker on the hit counter is for acoustical indication of hits. Listening to notched noise is considerably more informative than listening to the received signal because the test tone is removed and thus does not mask impairments. Noise hiss, modulation sidebands, SFI tones, the 'pinging' sound of modulation hits (phase and gain), the 'popping' sound of impulse hits or of narrow modulation hits, the 'crackling' sound of noise hits, the sequential 'popping' sounds of dial pulse all become clearly audible.

Jitter Meter

Jitter Meter operation is controlled by the METER MODE switch. Its sensitivity is changed by a factor of 5 under control of the "MULT READING BY" switch. Four readout positions and two calibrate positions are provided as follows:

<u>Switch Position</u>	<u>Quantity Displayed</u>	<u>Display Bandwidth</u>
BELL + LFAJ	Amplitude Jitter	3.5 to 300 Hz
LFAJ	Amplitude Jitter	3.5 to 20 Hz
LFPJ	Phase Jitter	2 to 20 Hz
BELL + LFPJ	Phase Jitter	2 to 300 Hz

NOTES ON 75L/P ADAPTER

OVERALL DESCRIPTION

The 75L/P is a 75L Hit Counter adapted to operate a Hewlett Packard 5150A Printer. This involves an added card in the 75L, with rear connector access, and also internal modifications to both the 75L and to the printer. These units (the 75L/P and HP 5150A printer) operated together with a PB-1C Line Analyzer or Bradley Telcom Phase Jitter Test Set, provide a printed record of the time of occurrence of transient events (hits) on a VF transmission facility. Resolution of the time printout is one second. The threshold of detection for Gain Hits and Gain Events is set by the GAIN HIT THRESHOLD switch of the 75L. The threshold of detection for Phase Hits and Phase Events is set by the PHASE HIT THRESHOLD switch of the 75L. The 75L/P and the Printer are connected with an adapter cable (furnished). The 75L/P and the line measuring instrument signal jacks are connected via one or two 310 cords. The 75L/P provides a 115 Volt RFI-filtered rear-access line receptacle into which the line measuring instrument line cord should be plugged, see Figure 1.

With the adapter cable and Printer connected to it, the 75L/P performance differs from that of the standard 75L in that the PHASE EVENT, GAIN EVENT, and MASSIVE HIT lights do not function because they are immediately reset by the printer adapter. When the adapter cable is removed the 75L/P behavior is identical to that of the standard 75L.

The maximum printer speed is 3 lines per second. This is the lower limit on interval between events which can be printed out. This interval is longer than the 1/7 second dead zone defined in PUB 41009, and mechanized in the 75L. This compromise was adopted to keep the cost of the printer down. This difference in dead time results in the possibility of the printer being occupied (for 1/3 second) recording, for example, a phase hit and therefore ignoring a second phase hit which occurs 1/7 second later. The 75L Phase Hit register will count both hits while the printer logs only one. If a short Dropout occurs, for example 10 milliseconds in duration, the start of Dropout and end of Dropout character will be printed on the same line.

PRINTOUT FORMAT

The Printer will print the Character A for particular event and - (dash) in the rest of the columns. There are 10 columns reserved for events, as shown in Table 1.

<u>DESCRIPTION</u>	<u>TIME OF DAY</u>	<u>COLUMNS</u>									
		10	9	8	7	6	5	4	3	2	1
TIME	01:00:00		-	-	-		-	-		-	-
PHASE HIT	00:00:02		-	-	-		-	-		-	A
GAIN HIT	00:00:03		-	-	-		-	-		A	-
PHASE EVENT	00:00:04		-	-	-		-	A		-	-
GAIN EVENT	00:00:05		-	-	-		A	-		-	-
START OF D.O.	00:00:06		-	-	A		-	-		-	-
END OF D.O. OR M.H.	00:00:07		-	A	-		-	-		-	-
START OF M.H.	00:00:08		A	-	-		-	-		-	-

TABLE 1

Columns 3, 6, & 10 are blank. The Printer is also self-triggered to print the time every hour on the hour as a check on system operation.

As shown in Table 1, when Character A is printed in Column 1 and - (dash) in the rest of the columns, it will indicate that at time 00:00:02 there was a Phase Hit which persisted for more than 4 milliseconds and which exceeded the threshold (in degrees) set on the PHASE HIT THRESHOLD switch of the 75L.

Example of a Massive Hit:

	10	9	8	7	6	5	4	3	2	1
10:00:05		A	-	-		-	-		-	-
11:01:10		-	A	-		-	-		-	-

In the above example, at 10:00:05 hour there was a Massive Hit. The end of the Massive Hit occurred at 11:01:10 hour of the day.

The Phase Event, Gain Event, and Massive Hit lights are reset instantly and automatically so that these displays on the 75L are not functional when the printer adapter is connected.

Example of a Dropout:

	10	9	8	7	6	5	4	3	2	1
14:01:09		-	-	A		-	-		-	-
14:10:09		-	A	-		-	-		-	-

The Dropout occurred at 14:01:09 hour of the day. It ended at 14:10:09 hour of the day. Therefore the Dropout lasted for 9 minutes.

PRINTER

The printer is a Hewlett Packard Model 5150A with 002 (clock) and 004 (BCD) option plus an internal wiring modification. The printer operates as a standard unit when the 75L/P interface cable is removed except that the normally unused pin 25 of the BCD interface cable connector has been internally connected to the one hour "carry" signal (004 Board Pin 3) for use in the 75L/P. Upon its occurrence, a print command is returned by the 75 L/P to the printer.

The controls of the Printer (see Printer Instruction Book) are set as follows:

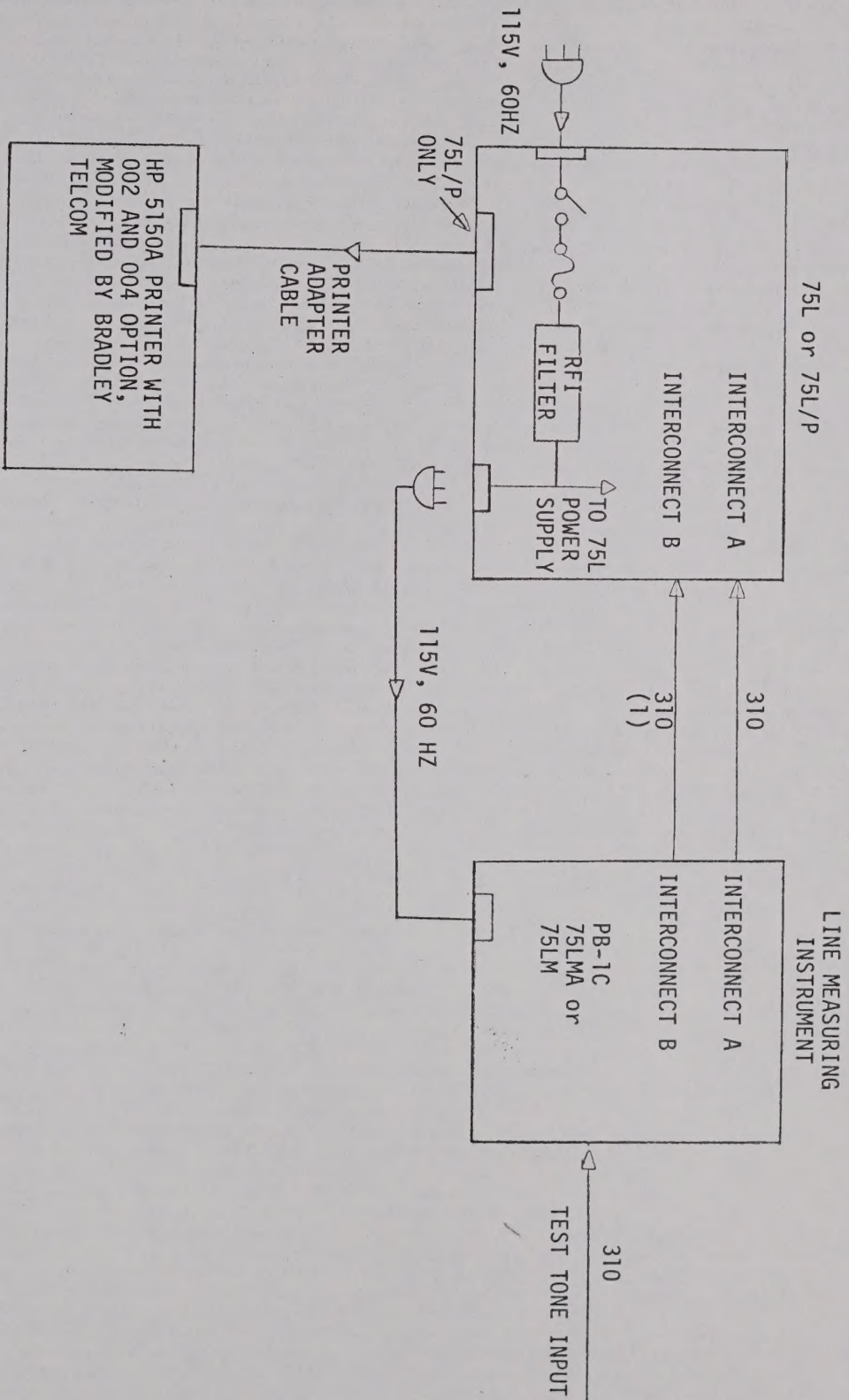
DATA + TRUE - Should be out

CMD - Irrelevant

PRINT INTERVAL, DATA - MINIMUM
TIME - MINIMUM

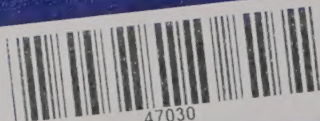
PRINT TIME - SAME LINE

MULTIPLIER, DATA, TIME - x1



(1) The 310 cord between INTERCONNECT B jacks may be omitted, see 75L Operating Instructions

FIGURE 1



47030

NUPTAKE
53540
MADE IN USA